

## **PANHANDLE SALT MARSH MORTALITY: A PRELUDE TO LOUISIANA BROWN MARSH?**

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Several episodes of marsh mortality with symptoms similar to brown marsh occurred in the Florida panhandle between 1990 and 1995. At sites in St. Joseph's Bay and Adams Beach, patches of smooth cordgrass (*Spartina alterniflora*) up to 1 hectare in area died completely within 1 month of the onset of chlorosis. Die-off patches occurred in lower, more frequently flooded, portions of each marsh, leaving a thin strip of surviving *Spartina* along the seaward edge.

No definitive cause for panhandle marsh mortality was determined. Sediment porewater sulfide concentrations ( $< 1$  mM) and salinity ( $< 35$  ppt) were probably not high enough to kill *Spartina alterniflora*. Simultaneous occurrence of die-off at two widely separated locations suggested that anthropogenic stresses were not involved. A fungus (*Fusarium* sp.) was isolated from dying plants, but pathogenicity was not demonstrated. No climatic or tidal events which coincided with die-off episodes were found.

Because natural recovery of die-off sites was very slow, a pilot-scale restoration project was carried out in St. Joseph's Bay in July 1994. Two-inch transplant units of four *Spartina alterniflora* accessions (Tampa Bay, St. Joseph's Bay, Mobile Bay, and Vermillion) were grown together at a nursery and planted at six die-off sites. Survival and growth were monitored quarterly for the first year and yearly thereafter. Flooding tolerance and survival varied among accessions: Vermillion and Mobile Bay accessions had the greatest survival, and St. Joseph's Bay and Tampa Bay accessions had lower survival at all sites. Accessions with higher survival (Vermillion and Mobile Bay) also had higher root ADH activities than St. Joseph's and Tampa Bay accessions. Survival and growth varied was lowest in the low intertidal zone and highest in the high intertidal zone for all accessions. However, flooding stress did not invoke die-off symptoms.

We conclude that, although low-elevation panhandle marshes are chronically stressed by tidal submergence, flooding stress per se did not cause acute die-off episodes. Instead, die-off has resulted from an undetermined and recurring pathogen, physical or chemical

factor. Similarity of panhandle die-off and brown marsh symptoms suggests they might result from the same pathogen, stressors, or process.